

CYPRESS
SEMICONDUCTOR

CY7C281

CY7C282

1024 x 8 PROM

T-46-13-27

Features

- CMOS for optimum speed/power
- High speed
 - 30 ns (commercial)
 - 45 ns (military)
- Low power
 - 495 mW (commercial)
 - 660 mW (military)
- EPROM technology 100% programmable
- Slim 300-mil or standard 600-mil DIP or 28-pin LCC
- 5V $\pm 10\%$ V_{CC}, commercial and military
- TTL-compatible I/O
- Direct replacement for bipolar PROMs

- Capable of withstanding >1500V static discharge

Functional Description

The CY7C281 and CY7C282 are high-performance 1024-word by 8-bit CMOS PROMs. They are functionally identical, but are packaged in 300-mil and 600-mil-wide packages respectively. The CY7C281 is also available in a 28-pin leadless chip carrier. The memory cells utilize proven EPROM floating-gate technology and byte-wide intelligent programming algorithms.

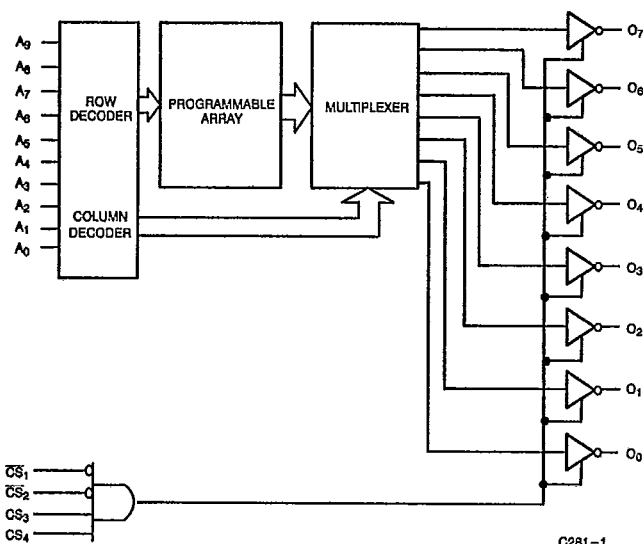
The CY7C281 and CY7C282 are plug-in replacements for bipolar devices and offer the advantages of lower power, superior performance, and programming yield. The EPROM cell requires only 13.5V for the supply voltage, and low current requirements

allow for gang programming. The EPROM cells allow each memory location to be tested 100% because each location is written into, erased, and repeatedly exercised prior to encapsulation. Each PROM is also tested for AC performance to guarantee that after customer programming, the product will meet DC and AC specification limits.

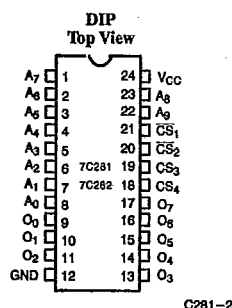
Reading is accomplished by placing an active LOW signal on $\overline{CS}_1$ and $\overline{CS}_2$, and active HIGH signals on CS_3 and CS_4 . The contents of the memory location addressed by the address lines ($A_0 - A_9$) will become available on the output lines ($O_0 - O_7$).



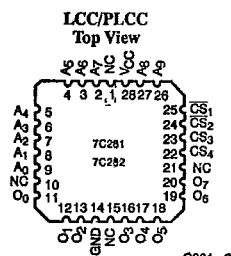
PROMS

Logic Block Diagram

C281-1

Pin Configurations

C281-2



C281-3

Selection Guide

		7C281-30 7C282-30	7C281-45 7C282-45
Maximum Access Time (ns)		30	45
Maximum Operating Current (mA)	Commercial	100	90
	Military		120



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Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature - 65°C to +150°C

Ambient Temperature with
Power Applied -55°C to +125°CSupply Voltage to Ground Potential
(Pin 24 to Pin 12) -0.5V to +7.0VDC Voltage Applied to Outputs
in High Z State -0.5V to +7.0V

DC Input Voltage -3.0V to +7.0V

DC Program Voltage (Pins 18, 20) 14.0V

Static Discharge Voltage >1500V
(per MIL-STD-883, Method 3015)

Latch-Up Current >200 mA

Operating Range

Range	Ambient Temperature	V _{CC}
Commercial	0°C to +70°C	5V ±10%
Industrial ^[1]	- 40°C to +85°C	5V ±10%
Military ^[2]	- 55°C to +125°C	5V ±10%

Electrical Characteristics Over the Operating Range^[3,4]

Parameter	Description	Test Conditions	7C281-30 7C282-30		7C281-45 7C282-45		Units
			Min.	Max.	Min.	Max.	
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = -4.0 mA	2.4		2.4		V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 16.0 mA		0.4		0.4	V
V _{IH}	Input HIGH Level	Guaranteed Input Logical HIGH Voltage for All Inputs	2.0		2.0		V
V _{IL}	Input LOW Level	Guaranteed Input Logical LOW Voltage for All Inputs		0.8		0.8	V
I _{IX}	Input Current	GND ≤ V _{IN} ≤ V _{CC}	- 10	+10	- 10	+10	μA
I _{OZ}	Output Leakage Current	V _{OL} ≤ V _{OUT} ≤ V _{OH} , Output Disabled	- 40	+40	- 40	+40	μA
I _{OS}	Output Short Circuit Current ^[5]	V _{CC} = Max., V _{OUT} = GND	- 20	- 90	- 20	- 90	mA
I _{CC}	Power Supply Current ^[6]	V _{CC} = Max., I _{OUT} = 0 mA	Commercial			90	mA
			Military			120	
V _{PP}	Program Voltage		13	14	13	14	V
V _{IHP}	Program HIGH Voltage		3.0		3.0		V
V _{ILP}	Program LOW Voltage			0.4		0.4	V
I _{PP}	Program Supply Current			50		50	mA

Capacitance^[4]

Parameters	Description	Test Conditions	Max.	Units
C _{IN}	Input Capacitance	T _A = 25°C, f = 1 MHz, V _{CC} = 5.0V	10	pF
C _{OUT}	Output Capacitance		10	pF

Notes:

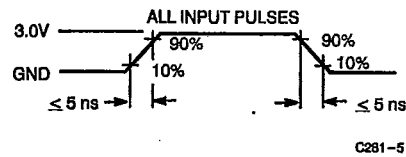
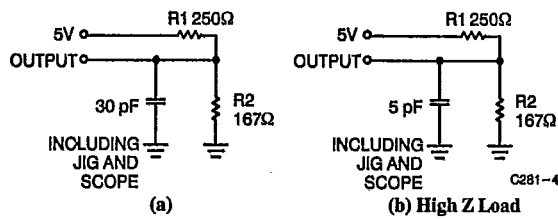
1. Contact a Cypress representative for industrial temperature range specifications.
2. T_A is the "instant on" case temperature.
3. See the last page of this specification for Group A subgroup testing information.
4. See "Introduction to CMOS PROMs" in this Data Book for general information on testing.
5. For test purposes, not more than one output at a time should be shorted. Short circuit test duration should not exceed 30 seconds.
6. Due to the design of the differential cell in this device, I_{CC} can only be accurately measured on a programmed array.

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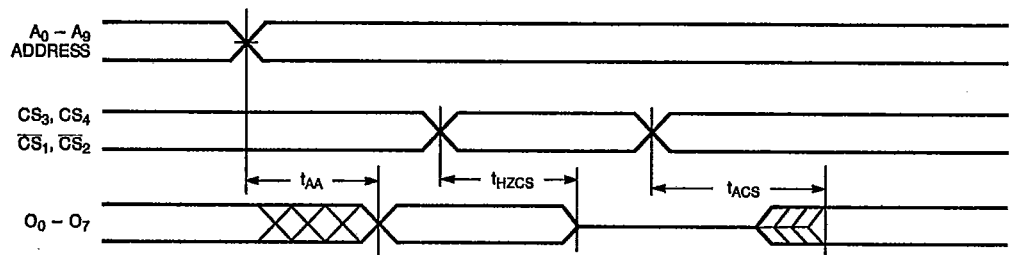
AC Test Loads and Waveforms^[4]

PROMS

Equivalent to: THEVENIN EQUIVALENT
 OUTPUT — 100Ω — 2.0V

C281-6

Switching Waveforms

Switching Characteristics Over the Operating Range^[2,4]

Parameters	Description	7C281-30 7C282-30		7C281-45 7C282-45		Units
		Min.	Max.	Min.	Max.	
t _{AA}	Address to Output Valid		30		45	ns
t _{HZCS}	Chip Select Inactive to High Z		20		25	ns
t _{ACS}	Chip Select Active to Output Valid		20		25	ns



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CY7C281
CY7C282**Programming Information**

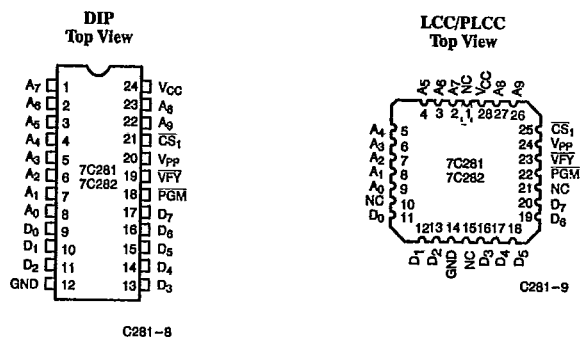
Programming support is available from Cypress as well as from a number of third party software vendors. For detailed programming information, including a listing of software packages, please see the

PROM Programming Information located at the end of this section. Programming algorithms can be obtained from any Cypress representative.

Table 1. Mode Selection

Mode	Pin Function ^[7]						
	Read or Output Disable	A ₉ - A ₀	CS ₄	CS ₃	CS ₂	CS ₁	O ₇ - O ₀
Read	Other	A ₉ - A ₀	PGM	V _{FF}	V _{PP}	CS ₁	D ₇ - D ₀
Read		A ₇ - A ₀	V _{IH}	V _{IH}	V _{IL}	V _{IL}	O ₇ - O ₀
Output Disable		A ₇ - A ₀	X	X	V _{IH}	X	High Z
Output Disable		A ₇ - A ₀	X	V _{IL}	X	X	High Z
Output Disable		A ₇ - A ₀	V _{IL}	X	X	X	High Z
Output Disable		A ₇ - A ₀	X	X	X	V _{IH}	High Z
Program		A ₇ - A ₀	V _{ILP}	V _{IHP}	V _{PP}	V _{ILP}	D ₇ - D ₀
Program Verify		A ₇ - A ₀	V _{IHP}	V _{ILP}	V _{PP}	V _{ILP}	O ₇ - O ₀
Program Inhibit		A ₇ - A ₀	V _{IHP}	V _{IHP}	V _{PP}	V _{ILP}	High Z
Intelligent Program		A ₇ - A ₀	V _{ILP}	V _{IHP}	V _{PP}	V _{ILP}	D ₇ - D ₀
Blank Check Ones		A ₇ - A ₀	V _{PP}	V _{ILP}	V _{ILP}	V _{ILP}	Ones
Blank Check Zeros		A ₇ - A ₀	V _{PP}	V _{IHP}	V _{ILP}	V _{ILP}	Zeros

Notes:

7. X = "don't care" but not to exceed V_{CC} ±5%.**Figure 1. Programming Pinouts**

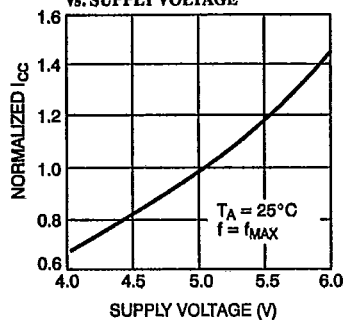
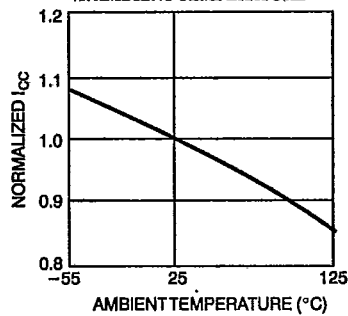
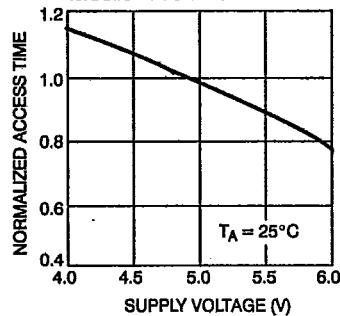


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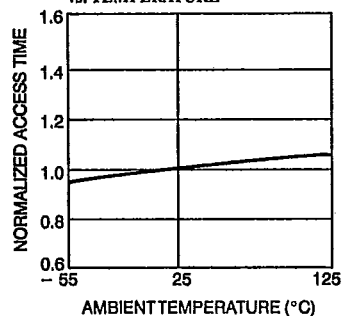
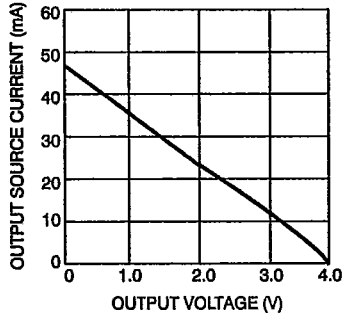
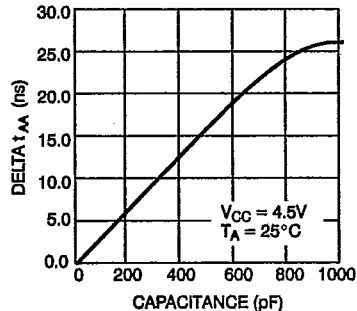
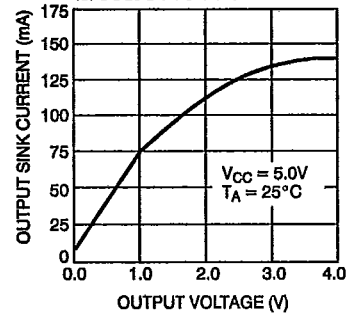
CY7C281

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Typical DC and AC Characteristics

NORMALIZED SUPPLY CURRENT
vs. SUPPLY VOLTAGENORMALIZED SUPPLY CURRENT
vs. AMBIENT TEMPERATURENORMALIZED ACCESS TIME
vs. SUPPLY VOLTAGE

PROMS

NORMALIZED ACCESS TIME
vs. TEMPERATUREOUTPUT SOURCE CURRENT
vs. VOLTAGETYPICAL ACCESS TIME CHANGE
vs. OUTPUT LOADINGOUTPUT SINK CURRENT
vs. OUTPUT VOLTAGE

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Ordering Information

Speed (ns)	Ordering Code	Package Type	Operating Range
30	CY7C281-30DC	D14	Commercial
	CY7C281-30JC	J64	
	CY7C281-30LC	L64	
	CY7C281-30PC	P13	
45	CY7C281-45DC	D14	Commercial
	CY7C281-45JC	J64	
	CY7C281-45LC	L64	
	CY7C281-45PC	P13	
	CY7C281-45DMB	D14	Military
	CY7C281-45KMB	K73	
	CY7C281-45LMB	L64	

Speed (ns)	Ordering Code	Package Type	Operating Range
30	CY7C282-30DC	D12	Commercial
	CY7C282-30PC	P11	
	CY7C282-45DC	D12	
	CY7C282-45PC	P11	
	CY7C282-45DMB	D12	Military

MILITARY SPECIFICATIONS
Group A Subgroup Testing

DC Characteristics

Parameters	Subgroups
V _{OH}	1, 2, 3
V _{OL}	1, 2, 3
V _{IH}	1, 2, 3
V _{IL}	1, 2, 3
I _{IX}	1, 2, 3
I _{OZ}	1, 2, 3
I _{CC}	1, 2, 3

Switching Characteristics

Parameters	Subgroups
t _{AA}	7, 8, 9, 10, 11
t _{ACS}	7, 8, 9, 10, 11

SMD Cross Reference

SMD Number	Suffix	Cypress Number
5962-87651	01JX	CY7C282-45DMB
5962-87651	01KX	CY7C281-45KMB
5962-87651	01LX	CY7C281-45DMB
5962-87651	013X	CY7C281-45LMB

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